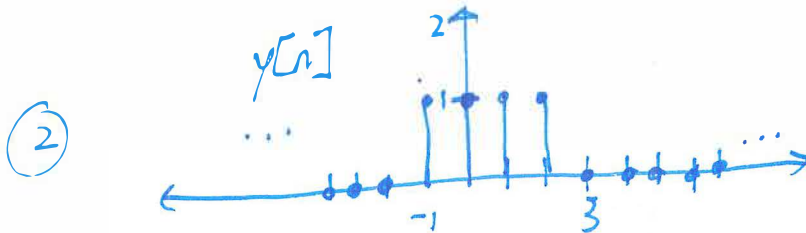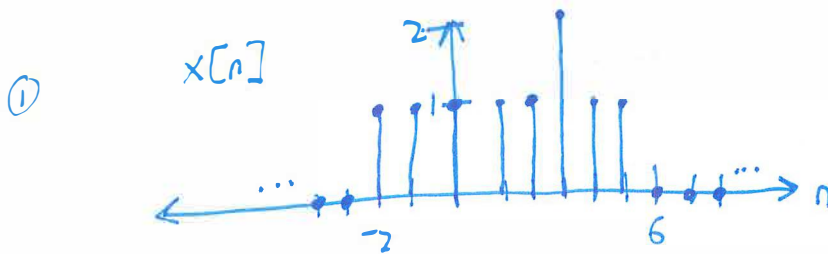**EE-3221 – Dr. Durant – Quiz 4**
Winter 2020-'21, Week 4

This is an **open**-book quiz. As always, you may also refer to your homework that is due today.

1. (3 points) Provide a stem plot for $x[n] = u[n+2] - u[n-6] + \delta[n-3]$.
2. (2 points) Based on your first plot ($x[n]$), provide a stem plot for $y[n] = x[2n]$.
3. (2 points) Based on your first plot ($x[n]$), find the energy of $x[n]$.

①

$x[n]$

②

$y[n]$

Time compression. Odd samples of x are _lost_.
Even samples of x occur twice as fast.

③ $E_x = \sum_n |x[n]|^2 = \sum_{n=-2}^{5} x^2[n] = 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 2^2 + 1^2 + 1^2$
$= \boxed{11}$

4. (3 points) Determine whether $w[n] = \cos(\pi / 3 \times n)$ is periodic and, if it is, determine the fundamental period.

$$w_0 = \frac{\pi}{3} \text{ radians/sample}$$

2π radians in a cycle

$$N = \frac{2\pi}{w_0} \frac{[\text{rad/cycle}]}{[\text{rad/sample}]}$$

$$= \frac{2\pi}{(\pi/3)} \frac{\text{samples}}{\text{cycle}}$$

$$= 6 \frac{\text{samples}}{\text{cycle}}$$

N is rational $\therefore$ $w[n]$ is periodic.

N is integer, so it is the period $\rightarrow$ 6

(If N is rational but not integer, analyze
per §7-3 of book / week 3 day 3 lecture.)